Alg. 2 Warm Up #5-2

Simplify:

1. $(6x^4y^{-3})^{-2}$

2. $\left[\frac{4x^4}{(5xy)^2}\right]^{1/2}$

3. Find all the special points for the parabola:

$y = (x + 8)(x - 2)$

HW Questions:

2-23. Your friend is taking an algebra class at a different school where she is not allowed to use a graphing calculator.

a. Explain to her how she can get a good sketch of the graph of the function $y = 2(x + 3)^2 - 8$ without using a calculator *and* without having to make an $x \rightarrow y$ table. Be sure to explain how to locate the vertex, whether the parabola should open up or down, and how its shape is related to the shape of the graph of $y = x^2$.

b. Your friend also needs to know the x- and y-intercepts. Show her how to find them without having to draw an accurate graph or use a graphing calculator.

2-24. Consider the equations $y = 3(x-1)^2 - 5$ and $y = 3x^2 - 6x - 2$.

a. Verify that they are equivalent by creating a table or graph for each equation.

b. Show algebraically that these two equations are equivalent by starting with one form and showing how to get the other.

c. Notice that the value for a is 3 in both forms of the equation, but that the numbers for b and c are different from the numbers for h and k. Why do you think the value for a would be the same number in both forms of the equation?

x	$y = 3(x-1)^2 - 5$
-2	$3(-2-1)^2 - 5 = 22$
-1	$3(-1-1)^2 - 5 = 7$
0	$3(0-1)^2 - 5 = -2$
1	$3(1-1)^2 - 5 = -5$

x	$y_2 = 3x^2 - 6x - 2$
-2	$3(-2)^2 - 6(-2) - 2 = 22$
-1	$3(-1)^2 - 6(-1) - 2 = 7$
0	$3(0)^2 - 6(0) - 2 = -2$
1	$3(1)^2 - 6(1) - 2 = -5$

b) $y = 3(x-1)^2 - 5$ $\qquad y = 3x^2 - 6x - 2$

$3(x-1)^2 - 5 \stackrel{?}{=} 3x^2 - 6x - 2$

$3(x^2 - 2x + 1) - 5$

$3x^2 - 6x + 3 - 5$

$3x^2 - 6x - 2$

2-26. The point $(3, -7)$ is on a line with a slope of $\frac{2}{3}$. Find another point on the line.

2-25. Use what you learned in the parabola investigation to write an equation for each of the parabolas described below.

a. A parabola opening upward, shifted 8 units right, and 5 units down.

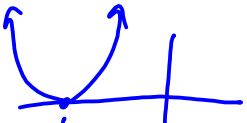
b. A parabola with a stretch factor of 10, sitting with its vertex on the x-axis at $x = -6$.

c. A downward opening parabola with vertex $(-7, -2)$ and a vertical compression of 0.6.

$y = -0.6(x+7)^2 - 2$

a) $y = a(x-h)^2 + k$

$y = 2(x-8)^2 - 5$

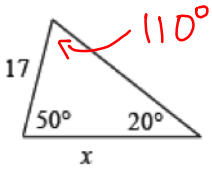
b) 

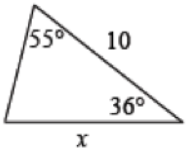
$y = 10(x+6)^2$

2-27. Simplify each expression without using a calculator. Remember that to simplify expressions with radicals, you can remove perfect square factors such as in this example: $\sqrt{18} = \sqrt{9 \cdot 2} = \sqrt{9} \cdot \sqrt{2} = 3\sqrt{2}$

a. $\sqrt{50}$ b. $\sqrt{72}$ c. $\sqrt{45}$

2-28. Find the value of x.

a. 

b. 

$$\frac{(\sin 110^\circ)x}{\sin 110^\circ} = \frac{17}{\sin 20^\circ}(\sin 110^\circ)$$

2-29. Suppose your parents spend an average of \$300 each month for your food.

a. In five years, when you are living on your own, how much will you be spending on food each month if you are eating about the same amount and inflation averages about 4% per year?

b. Write an equation that represents your monthly food bill x years from now if both the rate of inflation and your eating habits stay the same.

$100\% + 4\% = 104\%$

$y = 300(1.04)^x$

CP's: 2- #11, 13 and 14

2-13. p. 62 Graph the parabola $y = x^2$. Be sure to label any important points. When you are sure that your graph is complete and accurate, trace over it in colored pencil.

a. Find a way to change the equation is to make the $y = x^2$ parabola *stretch vertically*. That is, to make the graph look narrower, so the points in the parabola seem to rise away from the vertex more quickly. The new parabola should have the same vertex and orientation (i.e., open up) as $y = x^2$. Record the equations you try, along with their results. Write down the results even when they are wrong – they may come in handy later on.

b. Find a way to change the equation to make the $y = x^2$ parabola *compress vertically*. That is, to make the graph look flatter, so that the points seem to rise away from the vertex less quickly. Record the equations you try, along with their results and your observations.

c. Find a way to change the equation to make the same parabola *open downward*. The new parabola should be congruent (the same shape and size) to $y = x^2$, with the same vertex, except it should open downward so its vertex will be its highest point. Record the equations you try, their results, and your observations.

d. Find a way to change the equation to make the $y = x^2$ parabola *move 5 units down*. Your new parabola should look exactly like $y = x^2$, but the vertex should be at $(0,-5)$. Record the equations you try, along with their results. Include a comment about moving the graph up as well as down.

e. Find a way to change the equation to make the $y = x^2$ parabola *move 3 units to the right*. Your new parabola should look exactly like $y = x^2$, except that the vertex should be at the point $(3, 0)$. If you need an idea to get started, review your work on problem 2-11. Record the equations you try, along with their results. Include a comment about how to move the parabola to the left as well as how to move it to the right.

f. Find a way to change the equation to make the $y = x^2$ parabola *move 3 units to the left*, as in part (e), AND *stretch vertically*, as in part (a). Record the equations you try, along with their results.

Further Guidance section ends here.

From yesterday's CP's:

2-14. Find a way to change the equation to make the $y = x^2$ parabola *vertically compressed, open down, move six units up, and move two units to the left.* Where is the vertex of your new parabola?

vertical compression: pick: $0 < a < 1$

opens down: negative in front

move up 6 units: $+6$ at the end

move 2 units left: $(x+2)^2$

Vertex: $(-2, 6)$

Equation:

$$y = -0.2(x+2)^2 + 6$$

From yesterday's CP's:

2-14. Find a way to change the equation to make the $y = x^2$ parabola *vertically compressed, open down, move six units up, and move two units to the left.* Where is the vertex of your new parabola?

vertical compression: $y = 0.5x^2$

opens down: $y = -0.5x^2$

move up 6 units: $y = -0.5x^2 + 6$

move 2 units left: $y = -0.5(x+2)^2 + 6$

Equation:

Vertex: $(-2, 6)$

Math Spiral: more notes on transforming a parabola...

(also called vertex form) → vertex (h, k)

Graphing form: $y = a(x - h)^2 + k$

a
- If $a < 0$, then reflect the whole graph in the x-axis
- If $|a| > 1$, then it is a vertical stretch
- If $0 < |a| < 1$, then it is a vertical compression

h → It shifts the whole graph left or right. A horizontal translation.

k → A vertical translation. Moves the whole graph up or down

Parabola Quick Graphs
CP's: 2- 31 ---> 34

$y = a(x-h)^2 + k$

2-31. For each equation below, predict the coordinates of the vertex, the orientation (whether it opens up or down), and whether the graph will be a vertical stretch or a compression of $y = x^2$. Do not use a graphing calculator. Quickly make an accurate graph based on your predictions. How can you make the shape of your graph accurate without using a table? Be prepared to share your strategies with the class.

a. $y = (x+9)^2$

b. $y = x^2 + 7$

c. $y = 3x^2$

d. $y = \frac{1}{3}(x-1)^2$

e. $y = -(x-7)^2 + 6$

f. $y = 2(x+3)^2 - 8$

g. Now take out your graphing calculator and check your predictions for the equations in parts (a) through (f). Did you make any mistakes? If so, describe the mistake and what you need to do in order to correct it.

HW: 2-

#35 ---> 41